

WINDS.

The prevailing winds during May, 1889, are shown on chart i by arrows flying with the wind. In New England, the lower lake region, and the southeastern slope of the Rocky Mountains south to west winds were most frequently noted. In the middle Atlantic states and over the northeastern slope of the Rocky Mountains they were mostly from north to west. In the south Atlantic states and along the north and middle Pacific coasts, northwest to southwest; in Florida, and over the middle-eastern slope of the Rocky Mountains and the middle plateau region, variable; in the east and west Gulf states, Rio Grande Valley, Ohio valley and Tennessee, the upper lakes (except over Lake Superior), and the upper Mississippi and lower Missouri valleys, southerly; over Lake Superior, in the extreme Northwest, and the upper Missouri valley, northeast to northwest; over the southern and northern plateau regions, west to southwest, and on the south Pacific coast, west to northwest.

HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, have been reported as follows: Fort Elliott, Texas, 53, s., 6th; 52, se., 16th. Dodge City, Kans., 50, s., 4th. Fort Stanton, N. Mex., 52, w., 6th. Whipple Barracks (Prescott), Ariz., 52, sw., 6th.

LOCAL STORMS.

May, 1889, was characterized by unusually severe storms over the central and eastern districts. The remarkable precipitation and resultant floods which occurred in sections of the middle Atlantic states during the last two days of May and on June 1st constitute meteorological features of exceptional interest, and form the subject of a special paper in this REVIEW. The general meteorological conditions which attended the storms in the districts referred to are shown by four charts printed on the back of chart i, which represent, respectively, the results of observations taken at Signal Service stations at 8 p. m. of May 30th, 8 a. m. and 8 p. m. of May 31st, and 8 a. m. of June 1st, and the excessive rainfall and floods of that period are treated generally under their respective headings. The conditions presented by the 8 a. m. reports of May 30th called for the following general forecast, which was printed on the weather map issued by this office on the morning of that date: "Rain will prevail in New England, the lower lake region, southern Michigan, and thence southward to the south Atlantic and east Gulf states, with severe local storms in the middle, south Atlantic, east Gulf states, and the Ohio Valley."

The following descriptions of storms generally refer to disturbances which attended the passage of areas of low pressure traced on chart i:

1st. North Carolina.—Grover, Cleveland Co.: a cloud rose in the northwest at 5 p. m.; it suddenly turned very dark and appeared like smoke rising from a huge oil tank on fire. A yellowish cloud followed closely after, accompanied by heavy rain, hail, and high wind, unroofing and demolishing houses, leveling fences, and blowing down timber and orchards in this section. The path of the storm was about one-half mile wide and six miles long.—*Report of F. H. Dover.* Wilmington: reports from Warsaw, Duplin Co., a small town fifty miles north of this city, state that that place was visited at 4 p. m. by a terrific storm from the southeast, accompanied by rain, hail, and high wind, lasting but one or two minutes. Hail fell four to six inches in depth, and for the very short duration of the wind an almost incredible amount of damage is reported. One church and twenty houses were blown down, and of the church only the pulpit and one chair were left on the site. The estimated damage to property, cattle, and crops was between \$15,000 and \$20,000.

6th. Oregon.—Portland: at 6 p. m., a vast, oval-shaped, hollow cone of inky-black clouds appeared a few miles north

of station, moving slowly in a southeasterly course. The cone covered one-fourth of the sky and extended from the zenith to within about 1,000 feet of the earth. The mouth of the cone, near the earth, had well-defined but ragged edges of dark gray clouds which seemed to be whirling rapidly from right to left around the dark open centre of the immense funnel. At 6.15 p. m. the funnel seemed to dissipate into a thick, inky mass of clouds slowly moving towards the mountains in the southeast. No lightning was seen, and distant thunder was only heard twice while the phenomenon lasted. **Minnesota.**—Moorhead: the wind, which was high from the southwest during the afternoon, became very severe at 6.35 p. m., when an extreme velocity of seventy-two miles was recorded, the duration of which did not exceed forty-five seconds. Several out-houses, chimneys, etc., were blown down. The storm moved from southwest to northeast, and was accompanied by several brilliant flashes of lightning and heavy thunder. **Kansas.**—Hutchinson, Reno Co.: a terrible storm occurred near Stafford, Stafford Co., about 8 p. m., in which one man was instantly killed and about thirty persons were seriously injured; houses were demolished, barns torn down, and in places the growing crops were blown from the ground. The wind had been blowing a perfect gale for three days all over western Kansas, but the destructive path of the storm was confined to a narrow strip beginning in Stafford county, and extending in a northwesterly direction through Rice county.—*The (Mexico, Mo.) Republic, May 7.* Sterling, Rice Co.: a severe storm of wind, rain, and hail, accompanied by lightning and thunder, visited this section at 8.15 p. m. The storm gathered south of the city and traveled north and west about four miles, thence north and east. About fourteen barns, five houses, one church, one school house, and a large number of out-buildings were destroyed, the debris being scattered over the prairie for miles. Washington, Washington Co.: the storm which passed over Hollenberg, this county, in the evening, demolished the Methodist church and the Grand Army Republic hall; unroofed the grain elevator, and scattered the contents of the lumber yard over the prairie.—*Hutchinson (Kansas) Daily News, May 8.* **Dakota.**—Yankton: a violent thunder-storm from the southwest began 9.35 p. m., and continued into the night. Maximum velocity of wind, fifty-six miles per hour from the south at 10.05 p. m.; an unfinished building was blown down.

7th. Minnesota.—Saint Cloud, Stearns Co.: a terrible wind storm has been raging here since last evening. No great damage has been done in this town, but reports from the surrounding country state that a number of houses and barns have been unroofed or moved from their foundations.—*The Republic, Mexico, Mo., May 27th.* **Wisconsin.**—Green Bay: during the thunder-storm which prevailed between 5.05 p. m. and 5.18 p. m. a ball of fire jumped from the telephone wire, rolled along the street fifteen or twenty feet, throwing off brilliant sparks in every direction and then exploded with a report like that of a cannon and emitted clouds of smoke. At the telephone office a ball of fire came in over the wire, setting fire to the back of the switchboard and severely shocking one of the operators.

9th. Iowa.—Marshalltown, Marshall Co.: the worst hail-storm of years, accompanied by excessive rainfall, occurred during the day. Hundreds of windows were shattered, trees stripped of their foliage, fruit and vegetation seriously damaged, and fields badly washed out. The hail lay in drifts for two or three hours.—*Des Moines, Iowa, State Register, May 11.*

10th. Illinois.—Belvidere, Boone Co.: a most terrific hail, wind, and rain storm visited this city and vicinity in the afternoon. Hail-stones as large as walnuts fell for thirty minutes. The fruit trees are all in full bloom, and much damage will be done to cherries and late apples. Much of the planted corn will probably have to be replanted, the seed being literally washed out of the ground. The florists will be the worst sufferers, hundreds of lights of glass being broken and

plants cut to pieces. Unprotected stock in the open fields suffered seriously.—*The (Nashville, Tenn.) Herald, May 11.* Aledo, Mercer Co.: a heavy storm swept through this county at 5 p. m., doing considerable damage. Trees and fences were blown down and several houses and barns demolished.—*New York Daily Tribune, May 12.* Chicago: a thunder-storm, accompanied by vivid lightning, and moving from northwest to southeast, began 5.36 p. m. and ended 11 p. m. Rain commenced 6.05 p. m. and fell in torrents for a few minutes, then changed to hail, which fell very rapidly and covered the ground to a depth of one-half inch; some of the hail-stones measuring over one inch in diameter. *Iowa.*—Des Moines: a severe storm began 3.35 p. m. and ended 4.12 p. m. Maximum velocity of the wind forty-six miles per hour at 4.08 p. m. A number of houses and barns in this city were unroofed or otherwise damaged. *Pennsylvania.*—Hop Bottom, Susquehanna Co.: a thunder-storm, accompanied by very heavy rain, high wind, and some hail passed over this place between 2.45 p. m. and 3.15 p. m. The air was so dark during the storm that the clouds could not be seen, and the wind whirled in all directions. A number of buildings were demolished by the storm.—*Report of E. M. Tiffany, Michigan.*—Port Huron: at 9.30 a. m. the wind suddenly veered to northwest and increased in force, attaining a velocity of thirty-six miles per hour at 9.55 a. m. The storm ended 10.05 a. m. The schooner "Mary Hattie," which was about to enter the Saint Clair river, was driven ashore. *New York.*—Albany: a storm, moving from wnw. to ese. prevailed from 5.16 p. m. to 6.40 p. m. The storm was very violent for a few minutes, and trees, fences, and awnings were blown down.

10-11th. Illinois.—Geneva, Kane Co.: a heavy wind, accompanied by tremendous rainfall, passed over this section during the night. Hundreds of trees were blown down and many orchards ruined. It was the heaviest wind known here for years, and has ruined the prospect for a promising fruit crop.—*New York Daily Tribune, May 12.* *Pennsylvania.*—Pittsburgh: reports of damage from storm during the night of the 10-11th are coming in from all parts of Allegheny county, in fact from nearly every place in eastern Ohio and western Pennsylvania. Farms were washed out, houses, fences, and trees along the banks of streams were swept away, and landslides occurred on nearly every road leading from Pittsburgh. So far four deaths from drowning have been reported.—*New York Daily Tribune, May 12.*

11th. Indiana.—Indianapolis: reports show that dangerous storms swept over the southwestern portion of the state this afternoon; many buildings were demolished, and telegraph and telephone wires suffered badly.—*The (Nashville, Tenn.) Herald, May 12.* *Kentucky.*—Paducah, McCracken Co.: a terrific storm raged here this afternoon; many buildings were unroofed. The spire of the Methodist church was blown down, crushing the roof and wrecking the building.—*The (Nashville, Tenn.) Herald, May 12.*

12th. Texas.—Brady, McCulloch Co.: a very severe wind and hail storm passed through Concho and Menard counties, killing a number of sheep and calves, and putting out the eyes of several horses. When the storm crossed over Brady Creek it killed hundreds of fish, from large sized catfish down. The destructive path of the storm was about three-fourths of a mile wide.—*Report of W. H. Potter to the Texas State Weather Service.* La Grange, Fayette Co.: a very severe wind and rain storm, accompanied by hail, occurred on this date. The storm was very destructive to corn and cotton crops, which will require replanting in many places. Trees were uprooted, fences blown down, and telegraph poles prostrated. A land slide occurred on the Missouri Pacific railway, four miles north of this place, which delayed trains five hours. The path of the storm was very narrow, which fact was shown by its effect on vegetation.—*Report of Joseph Cottam to the Texas State Weather Service.* *Kentucky.*—Hopkinsville, Christian Co.: one of the most violent and destructive rain and hail storms ever known in this section passed over the southern portion of this county

late in the afternoon. At Longview and Bennettstown lumps of hail as large as goose eggs were picked up, and pieces of ice six inches long were seen. Crops suffered seriously. Tobacco plants were cut down, and fruit trees stripped of their leaves and blossoms. The heaviest loss was to wheat. It is estimated that 600 acres were entirely destroyed and as much more seriously damaged. Estimated loss, \$6,000 to \$10,000.—*The (Nashville, Tenn.) Daily American, 14.* *Virginia.*—Harrisonburgh, Rockingham Co.: a terrific storm passed over this county on this date. Lightning destroyed several barns and stables. Much stock was killed. A part of the county was visited by a severe hail storm which utterly destroyed the wheat crop, and fences and houses were blown down.—*New Haven (Conn.) News, May 14.* Dale Enterprise: a series of heavy thunder-storms passed over this place during the day, and one of a very destructive nature occurred at 5.30 p. m. The wind blew down fencing and timber, and a large dwelling house in course of construction was completely wrecked. Hail fell to a depth of one inch and remained on the ground for several hours after the storm had passed. All vegetation was completely riddled by the falling hail-stones. Within the space of fifteen minutes 1.10 inch of rain fell; the water rushed down the hillsides in torrents. Fencing was swept away by the flood in places where floods were never known to occur before. The path of the storm was about one mile wide. Depth of rainfall, within fourteen hours, 2.44 inches.—*Report of voluntary observer.*

13th. Washington Territory.—Tacoma: a destructive storm set in suddenly from the southwest at 5.50 p. m. A building in course of erection was demolished, burying the workmen in the ruins; four men were killed and several severely injured. A new building in the southern part of the city was also wrecked by the wind. *The (Portland, Oregon,) Oregonian, May 14.* *Kentucky.*—Louisville: a severe hail-storm is reported to have occurred in the suburbs of this city during the afternoon and evening. Reports also show that hail-storms occurred throughout the state during the day, and that crops in many sections suffered serious damage from them. *Lair, Harrison Co.:* a hail-storm of but a few minutes duration occurred about two miles south of this place at 3 p. m. The stones were unusually large and fell in sufficient quantity to cover the ground, knocking down horses and injuring stock and crops seriously; limbs of trees from one to one-and-one-half inch in diameter were broken off by the hail.—*Report of O. L. Ballinger.* *Georgia.*—Grantville, Coweta Co.: This community was visited during the day by a severe wind, rain, and hail storm, doing considerable damage to growing crops. Corn and cotton are badly injured, while gardens are almost ruined.—*The (Savannah Ga.) Morning News, May 16.* *Massachusetts.*—Vineyard Haven: a severe thunder-storm passed over this place between 8.20 and 10.10 p. m., moving from southwest to northeast. Several houses were struck by lightning, and telegraph lines were prostrated.

14th. Virginia.—Danville, Pittsylvania Co.: the severest storm ever known in this city occurred in the afternoon, doing much damage to houses, fences, fruit trees, etc.; estimated damage, \$3,000. The storm was accompanied by rain and slight hail, and lasted about fifteen minutes.—*The Daily Virginian, May 15.* Norfolk: a violent thunder-storm, attended by rain, hail, and high wind, and passing from southwest to northeast, occurred between 2.50 and 4.30 p. m. The wind, which attained a maximum velocity of forty-eight miles per hour, demolished out-buildings and uprooted trees. Truck gardens in this vicinity suffered much damage from the hail. *North Carolina.*—Kitty Hawk: at 8 p. m. the wind shifted suddenly from southwest to northwest, with a velocity of forty-five miles per hour for ten minutes, and accompanied by light rain. A violent hail-storm is reported seven to nine miles north of this place, breaking a large number of window-panes in residences. Several trees were blown down and fences damaged. Six iron poles on the coast line, in the track of the storm, were broken off, as was also the wire. *Wilmington:*

reports from Magnolia, Duplin Co., and from Lumberton, Robeson Co., state that a severe hail-storm passed over those places between 4 and 5 p. m. The storm approached from the west, and was accompanied by terrific west to north-west winds. Large hail-stones fell to a depth of from one to three inches. At Lumberton two houses were blown down and one unroofed. Most of the cotton crop in the sections visited by the storm will have to be replanted, as it is almost a total loss.

14-15th. Nebraska.—Omaha: the rain which began at 10 p. m., 14th, came down in torrents shortly after midnight and did considerable damage by flooding streets and overcrowding the capacity of sewers.—*Omaha (Nebr.) Bee*, May 15.

15th. Iowa.—Burlington, Des Moines Co.: a heavy rain-storm struck this city in the morning, and continued two hours. A wind-storm followed which unroofed two business houses, while barns and other buildings were moved from their foundations, and trees and fences blown down. The aggregate damage is considerable, though the individual losses are not heavy.—*Evening Herald, Duluth, Minn.*, May 16.

16th. Iowa.—A severe storm passed over Iowa during the night. At Waterloo and Cedar Falls the rain came down in torrents, so that in many places the water rushed over the tracks at such a rate that the north bound train was held for over an hour. On the Milwaukee road lightning struck and fired the depot at Volga City. Several bridges on the Turkey Creek branch were washed away. At Cedar Rapids, this morning, it took the form of a hail-storm; hail as large as hens' eggs fell, causing considerable damage to skylights, greenhouses, etc.—*The (Cedar Rapids, Iowa,) Daily Gazette*, May 16. **Arkansas.**—Hot Springs: a report from Buckville, Montgomery Co., states that the severest hail-storm known for years visited that section during the day. The hail-stones were of unusual size and fell with terrific force, damaging the crops, and in many places crushing through the tops of houses. The fruit crop is damaged 50 per cent.—*Galveston News*, 18.

17th. Kansas.—Abilene, Dickinson Co.: the severest storm in the history of the city raged here last night. The lower part of the city was completely flooded, and several houses have their cellars full of water. Thousands of dollars of damage has been done. Considerable hail fell during the storm.—*Galveston News*, May 18. **Leavenworth:** a severe thunder-storm, passing from west and northwest to east and southeast, began shortly after midnight and continued until 4.35 p. m. The storm was accompanied by heavy rain from 12.55 a. m. to 11.40 p. m., causing delay of trains from two to four hours on all railroads leading to this city. **Texas.**—Gainsville, Cook Co.: one of the most disastrous storms that ever visited this section occurred in the afternoon and evening at Mossville, this county. A number of houses were blown down, but no persons were injured. At Erle, this county, great damage was done to houses, and all through the western portion of the county the growing crops were badly injured. **Wylie, Collin Co.:** considerable rain and hail fell during the day, doing much damage to growing crops in this section.—*Galveston News*, May 19. **Wisconsin.**—Milwaukee: a severe thunder-storm, accompanied by excessive precipitation and vivid lightning passed over this city in the afternoon. Several buildings were struck by lightning. Three men were drowned while working in an underground sewer; the dam erected at the head of the excavation gave away and the force of the water was so great as to render escape impossible. **Missouri.**—Kansas City: a thunder-storm moving from northwest to southeast occurred in the afternoon. Rain, which began at 9.30 a. m., continued throughout the day, and was very excessive between 2 p. m. and 5 p. m., causing great damage in low-lying districts in the southeastern and western portions of this city, and in adjoining Kansas City, Kans. In a number of houses the cellars and lower floors are flooded, and many buildings in course of construction were injured by the settling of foundations, etc. A number of railroad tracks are under water and some of them have been buried under heavy land-slides, delaying trains from

nine to twenty-four hours. A number of the cable railways are also greatly delayed and damaged by the flooding of the engine-rooms. A rough estimate places the damage at \$50,000.

18th. Texas.—Corpus Christi: a thunder-storm, accompanied by heavy rain, began during the night and ended 8.10 a. m. Maximum velocity of wind forty-seven miles per hour from the northeast at 7.57 a. m. All communication on the Western Union telegraph lines northward was cut off.

19th. Kansas.—Topeka: a thunder-storm, accompanied by heavy rain, passed over this city in the evening. The wind attained a maximum velocity of thirty-two miles per hour at 8 p. m. Several houses in course of erection in the western portion of the city were demolished, and one church steeple was blown down. **Pennsylvania.**—Oil City, Venango Co.: a heavy rain-storm, accompanied by thunder and lightning, passed over this place at 1.30 a. m. An oil well near Norway, Chester Co., with a tank full of oil, was ignited by lightning and destroyed, and at Rouseville, Venango Co., a church was struck by lightning and burned to the ground.—*New York Daily Tribune*, May 20. **Ohio.**—Tiffin, Seneca Co.: a storm passed over the southwestern part of this county last night. The wind blew a gale and at Berwick many houses and barns were unroofed, and many miles of fencing blown down. Near Bascomb a large number of buildings were damaged. The rain fell in torrents, accompanied by hail, and the crops were injured considerably. The damage will run up into thousands of dollars.—*New York Daily Tribune*, May 20.

20th. Pennsylvania.—Scranton, Lackawanna Co.: the stretch of farming country from Clark's Summit, on the Delaware, Lackawanna, and Western railroad, east to and beyond the neighboring village of Clark's Green, seven miles north of Scranton, was devastated by a storm this afternoon that left wreckage and destruction all along its path. The fury of the storm, accompanied by a deluge of rain, began shortly after noon and lasted about half an hour. Several buildings were demolished, and every orchard in the path of the storm was wrecked, trees being torn up by the roots and carried many yards. The storm was the most destructive that has ever occurred in northeastern Pennsylvania.—*Commercial Gazette, Pittsburgh, Pa.*, May 21. **Tennessee.**—Nashville: a severe gale, accompanied by light rain and thunder, passed over this city between 5.30 and 6 p. m., causing considerable damage by prostrating trees, fences, etc. In the outskirts of the city a church was completely wrecked.

20th-21st. New York.—Troy, Rensselaer Co.: the most disastrous storm and freshet for many years occurred here during these dates. The Champlain canal overflowed and the crops in the lowlands were ruined. At Comstock's, Washington Co., four inches of rain fell during these days, causing serious damage to crops. A furious storm of wind, rain, and hail occurred at Sandy Hill, same county, causing considerable damage to crops.—*Evening Wisconsin, Milwaukee*, May 22.

22d. West Virginia.—Wheeling, Harrison Co., was visited this day by a terrific hail-storm which did great damage to crops. In the city hail lay on the ground three to five inches deep. The loss to farmers will be very heavy. *The (La Crosse, Wis.) Chronicle*, May 23.

23d. Missouri.—Kansas City: a thunder-storm, passing from west to east, and attended by vivid lightning, loud thunder, and unusually large hail, with heavy rain, occurred between 6.25 p. m. and 9.45 p. m. Hail fell for ten minutes, some of the hail-stones measuring two inches in diameter, breaking thousands of panes of glass, and causing much damage to hot-houses and plants in the eastern and southern sections of the city. The hail-belt is reported to have been about two miles wide and to extend eastward about thirty miles. All outgoing trains from the city were delayed, and a washout was caused by the extraordinarily heavy rain on the Union Pacific railroad, about seventeen miles west of this city.

25th. Tennessee.—Knoxville: a thunder-storm from the west began 2.40 p. m. and ended 2.58 p. m., when rain and hail began, a precipitation of 0.50 inch occurring in ten minutes.

The hail-stones measured from one-quarter to one-half inch in diameter. The wind, which blew at the rate of twenty-eight miles per hour for five minutes, attained, during a gust, a velocity of forty miles per hour. Another storm from the west prevailed between 5.45 p. m. and 7 p. m.; maximum velocity of the wind, thirty-six miles per hour, at 6.05 p. m. Several cellars in the city were flooded by the heavy rain.

27-28th. New York.—Albany: one of the most severe gales of the season began at 6.54 p. m., 27th, and continued until 4.36 p. m. the following day; maximum velocity of wind, fifty-four miles per hour, at 2.10 a. m., 28th. Considerable damage was done to the outer breakwater by the wind and high sea; the inner breakwater was completely submerged. Trees, signs, etc., suffered from the gale. Navigation was entirely suspended during the early part of the 28th.

29-30th. Michigan.—Detroit: a heavy rain began 9.50 a. m., 29th, and continued steadily during the night and following day. A gale set in 7.18 a. m., 30th, and ended 8.51 p. m., same day; maximum velocity of the wind, thirty-two miles per hour from the northeast, at 3 p. m. The heavy rain caused considerable damage to buildings in course of erection, and several squares of the cedar paving was loosened and rendered useless. The traffic in the streets was seriously impeded and business generally suspended. Reports from all over the state show that the heavy rain during these days caused great damage to crops.

30th. Kansas.—Topeka: a storm began at 4.45 p. m. in the eastern part of Marion county, and travelled due east until within two miles of Clements, Chase Co., thence it passed

alternately southeast and northeast until it reached a high bluff about three miles from Clements, where it was dissipated. Time of passage forty-five minutes. The storm demolished several buildings, trees, and fences in its path. One man was killed and several seriously injured. **North Carolina.**—Charlotte: high wind began 11.30 a. m., and continued until 6.15 p. m., from the southeast and south; maximum velocity, thirty-four miles per hour from the southeast. Heavy rain began about noon and continued at intervals throughout the day, at times very heavy. Many fruit trees were blown down and other minor damage done in this city. A large tobacco warehouse was blown down at Danville, near this city; five persons were killed and several seriously wounded. Small grain, which was ready for harvesting, was considerably injured by the heavy rain and high wind. **Wisconsin.**—Milwaukee: a gale from the northeast began 8.15 a. m., 30th, and ended 2.15 a. m., 31st; maximum velocity of the wind forty-two miles from the northeast at 12.05 p. m., 30th. It is reported that the storm was very severe on Lake Michigan; a large number of vessels having sprung a leak, lost deck loads, and suffered other minor mishaps.

30th-31st. South Carolina.—Charleston: brisk to high southerly winds prevailed all day, 30th, and continued until the early part of the following day; maximum velocity of the wind thirty-six miles per hour from the south at 5.40 p. m., 30th. A similar velocity from the southeast was also recorded at 3.40 a. m., 31st. The steamer "Pilot Boy," and the pilot boat "Charleston," were blown ashore during the gale; they sustained but slight injury.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the various stations; the highest and lowest water for May, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, May, 1889 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La.	29.9	1	17.9	29	10.9	7.0
Arkansas River:						
Fort Smith, Ark.	22.0	23	14.0	14	3.8	10.2
Little Rock, Ark.	23.0	26	15.4	16, 17	8.0	9.4
Missouri River:						
Fort Buford, Dak*		31	6.4	15	2.3	4.1
Omaha, Nebr.	18.0	1, 31	7.1	13, 14	6.4	0.7
Leavenworth, Kans.	20.0	28, 29, 30	9.2	5, 6	7.0	2.2
Kansas City, Mo.	21.0	29, 30	10.6	6	7.2	3.4
Mississippi River:						
Saint Paul, Minn.	14.5	21	4.5	15	3.2	1.3
La Crosse, Wis.	24.0	26, 27	6.6	1	4.6	2.0
Dubuque, Iowa	16.0	30	7.4	1	4.8	2.6
Davenport, Iowa	15.0	31	5.1	1, 2, 3, 4	3.2	1.9
Keokuk, Iowa	14.0	21, 22, 24	6.2	6, 7	3.0	3.2
Saint Louis, Mo.	32.0	31	24.1	9, 12	7.8	16.3
Cairo, Ill.	40.0	26	20.8	19	12.7	8.1
Memphis, Tenn.	34.0	1	16.3	21, 22	10.0	6.3
Vicksburg, Miss.	41.0	2	26.1	26	13.1	13.0
New Orleans, La.	13.0	5	9.1	25, 26, 28	4.3	4.8
Ohio River:						
Pittsburgh, Pa.	22.0	1	10.8	10	3.7	7.1
Parkersburg, W. Va.	38.0	2	14.0	22, 23	5.8	8.2
Cincinnati, Ohio	50.0	6	24.0	27	10.8	13.2
Louisville, Ky.	25.0	7	9.4	28	5.8	3.6
Cumberland River:						
Nashville, Tenn.	40.0	1, 2	6.8	25, 28, 29	3.4	3.4
Tennessee River:						
Chattanooga, Tenn.	33.0	7	5.0	26, 27, 28	2.7	2.3
Monongahela River:						
Pittsburgh, Pa.	29.0	1	10.8	10	3.7	7.1
Savannah River:						
Augusta, Ga.	32.0	31	9.8	30	6.8	3.0
Willamette River:						
Portland, Oregon ..	15.0	21	10.0	3, 4	5.2	4.8

* 13 days missing.

Mississippi River.—Vicksburg, Miss., 26th: this morning the stage of water in the river, 13.1 feet above low-water mark, is the lowest reading in May since the opening of the Signal Service Station in 1872.—*Report of Signal Service observer.*

Erie Canal.—Rochester, N. Y.: the canal was opened to navigation for the season on the 1st.

FLOODS.

A report, collated from all available data, of the disastrous floods of May 30th, 31st, and June 1st, in districts of the Middle Atlantic states and upper Ohio valley, is published in this issue of the REVIEW. The following reports refer to floods noted during the month in other sections of the country:

Kansas City, Mo.: at 3.30 a. m., 19th, two spans, each 120 feet long, of the National Waterworks Company's bridge, over the Kaw River, upon which the thirty-six-inch water main that supplies the city with water is supported, was washed away by the pressure of the high water and the jamming of driftwood. Damage estimated at \$20,000.

Chillicothe, Livingston Co., Mo., 21st: the Grand River, near this place, is greatly swollen, and the bottoms are flooded. Great damage and some loss of life is reported. All the ferry-boats have been washed away, and the bridges cannot be approached.—*Union Advertiser, Rochester, N. Y., May 21st.*

Littleton, Grafton Co., N. H., 22d: the heavy rains of the past two nights caused the upper reservoir of the Littleton Water and Electric Light Company to burst last night. The reservoir covered about eight acres, and the great body of water came down Palmer brook, gullying it into a large river bed, uprooting trees, and piling up debris. Two bridges and one barn were demolished, a dwelling seriously damaged, and the fields along the brook were flooded.—*Rochester, N. Y., Herald, May 23d.*

Albany, N. Y., 24th: the recent rains have caused the creeks along the Delaware and Hudson railroad to overflow and flood the lands from Smith's Basin, Washington Co., to Whitehall, same county. Considerable damage has been done to crops. Business on the Champlain canal has been suspended on account of the high water in the canal.—*New London, Conn., Telegraph, May 25.*

Topeka, Kans., 27th: the fields on the north side of Kansas River, between this place and Kansas City, are about one-third under water from the heavy rain in that section on the 23d. Houses and barns were observed standing on minia-